

MATRIX CONVERTER TECHNOLOGY AND ITS APPLICATIONS

Matrix converter can achieve the ac-ac conversion without needing a dc link since it performs the conversion directly from ac to ac. In addition, multiphase matrix converters have a sinusoidal input current and output voltage waveforms with adjustable amplitude and frequency. The converter structure has bi-directional power switches which provide regenerative operation of the motor. These converters have drawn the interest of the researchers due to several desirable characteristics, including fast dynamic, high power/volume ratio, inherent capability of four-quadrant operation and low harmonic contents. General types of matrix converters and their modulation and control algorithms will be presented with input and output waveforms.

The main application of the matrix converter is variable speed induction motor drive systems. However, the converter can be used in variable speed wind turbine generation systems as well by replacing the conventional back-to-back converters. In this case, the power flow can be provided in single stage without requiring any dc link by placing the matrix converter between the rotor windings of DFIG and the utility power lines. Moreover, both synchronous and subsynchronous operations are allowed. Some simulation and experimental results for both applications will also be presented.

Biography



Professor Sedat Sünter studied at The University of Firat, Turkey and received a B.Sc. (First Class) in Electrical Engineering in 1986 and subsequently MSc in 1989. From 1988 to 1991 he worked as a Research Assistant at The University of Firat involved in teaching and research in power electronic systems. He received a scholarship from Turkish Government for PhD study abroad in 1991. Consequently, He was accepted by The University of Nottingham, UK and received his PhD in Electrical and Electronic Engineering in the area of power electronic systems in 1995. Since 1995 he has been a Lecturer in Power Electronics at the University of Firat, Turkey. He has been promoted to Associate Professor in 2000 and received full Professor of Power Electronics at Firat University in July 2006. He has been in UK as visiting professor for three months in 2013. In literature, an algorithm on Matrix Converters has been referred to his name as “Sunter-Clare Algorithm”. He was vice Dean of the Faculty of Engineering in Firat University between 2004 and 2007. Since 2014, Professor Sünter is Head of The International Office in Firat University. He is also Institutional Coordinator of Erasmus+ Program. His research interests are: Power electronic converters and modulation strategies, matrix converters, resonant converters, variable speed drive systems, renewable and energy. Professor Sünter has a number of papers published in various journals and conference proceedings.